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Current Status of Transboundary Fish Diseases in Lao PDR: Occurrence, Surveillance, Research and Training

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Introduction

Lao PDR is a landlocked country with no direct access to the sea. Fisheries resources are derived purely from fresh water resources (Tables 1 and 2). The resources originate from the Mekong River, reservoirs and its tributaries (40%), pond, swamps, wetlands, flood plains (26%), rice field (32%) and cage culture (2%). Food production of Lao PDR is dominated by subsistence agriculture, which accounts for about 65% (for fish 7%) of GDP and it is estimated that 85% of the population rely on farming practices. The predominant crop is rice, which takes up more than 80% of the cultivated area. Other foods locally produced include: beef, chicken, pork, eggs, and a wide range of fruits and vegetables. Fishes produced in the country are mainly consumed locally, especially because fish products in Lao PDR are not exported yet. Most fish are marketed in fresh form. Processing of fish is by drying, fermentation, and smoking. The domestic fish marketing system starts with the middle trader who collects the fish from the fishermen (fish pond, reservoirs, Mekong River, etc.) and bring them to the landing market in the village. In some cases, another trader will buy the fish from the first trader and sends them to town market for retail. Since villages have no cold storage facilities for the fish products, the fish is marketing in fresh form. This lack of cold storage facility system leads to unstable fish price. For instance, during peak harvest season, the fish price is very low, but it easily goes up in the dry season when fish production is very low.

The industrial sector is small, contributing about 14% of GDP which ranged from medium-sized manufacturing plants to small operations producing at residential properties. Based on the annual statistics in 1999-2000, there are about 800 food manufacturing plants in Lao PDR located

mostly in big towns. Food and fishery products include baked goods, noodles, milk, salt, fish sauces, fermented fish, ice, canned beverages and agricultural processed products. Presently, there is little fish processing in Lao PDR, hence the trend towards increased in fish manufacturing. Post-harvest management and practices have been traditionally done by women, and this has become a very important consideration in gender issues and programs. There is no available information on production of koi carp.

Table 1. Species of fish produced in different fish production systems, or caught in reservoirs and natural water bodies

	Lao name	English name	Scientific name
Pond culture	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa marican	Indian carp	<i>Cirrhinar mrigala</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristithys nobilis</i>
	Pa kedleab	Silver carp	<i>Hypophthalmichthys molitrix</i>
	Pa rohu	Rohu	<i>Labeo rohita</i>
	Pa salid	Snakeskin gourami	<i>Trichogaster pectoralis</i>
Rice fish culture	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
State hatchery	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa marican	Indian carp	<i>Cirrhinar mrigala</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristithys nobilis</i>
	Pa kedleab	Silver carp	<i>Hypophthalmichthys molitrix</i>
	Pa rohu	Rohu	<i>Labeo rohita</i>
	Pa duc	Catfish	<i>Clarias</i> spp.
Private hatchery	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristithys nobilis</i>
Community pond	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa marican	Indian carp	<i>Cirrhinar mrigala</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristithys nobilis</i>
	Pa kedleab	Silver carp	<i>Hypophthalmichthys molitrix</i>
	Pa rohu	Rohu	<i>Labeo rohita</i>

Table 1 (continuation)

	Lao name	English name	Scientific name
Reservoir	Pa nin	Tilapia	<i>Oreochromis</i> sp.
	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa marican	Indian carp	<i>Cirrhinar mrigala</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristihthys nobilis</i>
	Pa kedleab	Silver carp	<i>Hypophthalmichthys molitrix</i>
Nursery	Pa rohu	Rohu	<i>Labeo rohita</i>
	Pa pok	Barb	<i>Puntius orphoides</i>
	Pa Sieu		<i>Esomus goddardi</i> (Cyprinidae)
Capture Fisheries	Pa nai	Common carp	<i>Cyprinus carpio</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa hua nyai	Bighead carp	<i>Aristihthys nobilis</i>
	Pa paak	Javanese carp	<i>Puntius gonionotus</i>
	Pa salid	Snakeskin gourami	<i>Trichogaster pectoralis</i>
	Pa duk	Catfish	<i>Clarias</i> spp.
	Pa lot	na	na
	Pa kho	na	na
	Pa soud	na	na
	Pa pok	na	na
	Pa kheng	na	na
	Pa tong	na	na
	Eel	na	na
	Pa kabok	na	na
	Pa kun	na	na
	Pa kuilan	na	na
	Pa dok ngiew	na	na
	Pa kot	na	<i>Mystas numerus</i>
	Pa Kha nyaeng	na	<i>Mystus carvasius</i>
	Pa seuam	na	na
Pa lon	na	<i>Cirrhinus microlepis</i>	
Pa Khao	na	<i>Wallagonia attu</i>	
Pa siew	na	na	

na: not available

Table 2. Fish Production in Lao PDR, from 1998 to 2002

Year	Fish Caught (MT)			Total Production (MT)
	C ¹	I ²	A ³	
1998	2,940	2,520	36,540	42,000
1999	3,020	2,416	54,967	60,403
2000	17,790 3,421	5,169 2,870	10,300	71,316
			475	
			23,850 7,441	
2001	17,790 3,421	5,169 2,870	12,081	73,135
			513	
			23,850 7,441	
2002	19,061 4,847	3,791 5,791	28,458	93,156
			900	
			23,858 6,500	

Sources of information: DLF, Remark: FISHSTAT

1 = Capture Fisheries Resources, 2 = Inland Fisheries, 3 = Aquaculture Fish Pond

I. Fish Diseases in Lao PDR

I-1. Current Status of Fish Diseases

Fish is an important food for Lao people, both for subsistence and to generate income. Therefore, fish disease occurrence can affect fish production.

In Lao PDR, fish disease so far has not been a serious problem compared to another countries in South East Asia. However, some fish diseases have been observed in the remote and cool part of northern and southern Lao PDR. These diseases include *Learnea* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., *Ichthyophthirius multifiliis*, *Trichodina* sp., *Cryptocaryon* sp., *Epistylis* sp., *Oodinium* sp., and the bacterium, *Edwardsiella tarda*. More information is provided in Table 3. The Lao Government is very concerned about issues on fish diseases and tries to find the solution. Particularly, the Department of Livestock and Living Aquatic Resources Research Center (LARReC) is the agency in charge of this aspect. In this agency, fish diseases have been considered as a very important research activity since 1999.

Table 3. Ranking of the different disease, production-related problems and number of respondents reporting for each production systems

Disease and production-related problems	Total number respondents (families, community pond enterprise)	Production Systems							
		A	B	C	D	E	F	G	H
Death no signs	67 families	21					21		25
Ped erosion (EUS-like)	59 families, 2 communities 60 ponds (204 families)	3		2 (204 families)			21		35
Predation by snake fish and crab	58 families, 1 state hatchery	47	11		1				
Overstocking	37 families								
Not enough food	36 families								
Lack of experience technical knowledge	31 families	31							
Red spots with skin intact	21 families						21		
Fry too small	20 families	20							
Weeds and polluted	16 families						16		
Flood	15 families	15							
Lack of oxygen cylinders	6 families					5		1	
Lack of nursery pond	6 families					6			
Low hatching rate	6 families					6			
Damaged eggs	6 families					6			
Poor selection of broodstock	6 families					6			
Red patches	5 families	3	2						
<i>Lernaea</i> infection	4 families, 1 state hatchery	3	1		1				
Death - white spot	5 families					5			
Not enough water	4 families	4							
Not enough hapa net	3 private hatcheries					2		1	
Difficulty in water management	2 private hatcheries					2			
Inadequate distribution of water	1 state hatchery				1				
Predation by insects	1 state hatchery				1				
Poor genetics	1 state hatchery				1				
Erosion of dikes	1 state hatchery				1				

A: pond culture; **B:** rice fish culture; **C:** community pond; **D:** state hatchery; **E:** private hatchery; **F:** reservoir; **G :** nursery; and **H :** capture fisheries

I-2. Koi Herpesvirus Disease (KHVD) of Common Carp and Koi Carp

Unfortunately no information is available on KHVD. However, clinical signs of KHVD have been observed in some places in a lake and in pond culture systems.

II. Current Status of Viral Diseases in the Production of Shrimps

II-1. Production of Shrimps

There is no shrimp culture pond activity to support consumption in the country. Because of this, the Government of Lao PDR has a policy of allowing the importation of seafood into the country for consumption. The yearly average total amount of imported seafood is about 1200-1300 metric tons. The price of shrimp is about 80000 kip per kilogram (US\$8.00). Each importing company must be registered and pays an import tax to the Department of Taxation.

Quality control of imported seafood is the responsibility of government officials, specifically veterinarians, at the border check points. This work is under the supervision of the Department of Livestock and Fisheries. The importation document must specify the quantity, types of processing and packaging, and the means of transport. In some cases, a sample is taken for laboratory analysis in order to examine for animal diseases.

II-2. Viral Diseases of Shrimps

Unfortunately, there is no information available on the occurrence of WSSV and TSV in shrimps.

III. Surveillance, Monitoring and Diagnosis of Aquatic Animals

The Department of Livestock and Fishery's Living Aquatic Resource Research Centre is responsible for monitoring occurrences of diseases. The Department is under the Ministry of Agriculture and Forestry with the following address and contact numbers:

Ministry of Agriculture and Forestry
Department of Livestock and Fisheries
National Animal Health Centre
P.O. Box 811 Vientiane, Lao PDR
Tel: 856-21 416 932 or 856-21 241 581, Fax: 856-21 415 674

Surveillance and monitoring for diseases of aquatic animals are conducted periodically by the Living Aquatic Resource Research Centre in order to prevent diseases. Observations on environmental conditions, water quality and water color are part of the monitoring.

The laboratory has the capacity to perform bacterial, fungal and parasitological analysis, but not for the examination of virus infections. The bacteriology laboratory has the ability to isolate and identify most bacterial species. Examination for protozoan and metazoan parasites, blood parasites, and external and internal parasites of livestock are regularly undertaken. The laboratories are capable of disease diagnosis at Levels I and II.

IV. Quarantine Services to Prevent Entry of Diseases of Aquatic Animals

The following are the requirements to support shipment of fishery products:

- Brood for live and aquarium fishes = Health certificates from exporting country are required;
- Frozen fish requires an importation document or a permit specifying the quantity, type, processing method, packaging and the means of transport;
- In some cases a sample is taken for aquatic animal disease; and
- Quality control certification of imported products is the responsibility of the government officials at the border checkpoint.

The inspection aims to minimize transmission of animal diseases to humans. For the Harmonization of Certificate and testing at the National and Regional level, we need to improve the Diagnostic Capacity of our laboratory to meet the requirement of International Standard. At present, we do not have enough trained staff and facilities to achieve it because we do not have enough financial support from the Government and also from international organizations. The current constraint for the implementation of this inspection is a lack of funding to support the work of officials at the border checkpoints. In addition, the officials have little training or experience in the inspection of shrimp and other seafood types. Likewise, the veterinary law to enforce these preventive measures is not in place but we hope to remedy this in the near future.

V. Research and Training of Fish Health Staff for Quarantine, Diagnosis, and Surveillance of Diseases of Aquatic Animals

There are significant opportunities to gain synergetic benefits from cooperation between the different divisions of Department of Livestock and Fisheries (DLF) in key areas, specifically laboratory system, surveillance and information management. An integrated surveillance system should be established for aquatic animals and livestock using active and passive surveillance techniques established during previous and current livestock health ACIAR project. An integrated information system should be established to meet the needs of the Department of Livestock and Fisheries based on existing system, and utilizing the district-level record keeping system

developed under the Regional Development Committee (RDC) for Livestock and Fisheries Development in Southern Laos. Parallel to the DLF is the recently created National Agriculture and Forestry Research Institute (NAFRI), and a sub-section, the Lao Animal Research Institute with functions yet to be clarified.

The agencies that conduct training on Fish Diseases are LARReC, DLF and NAHC all under the Ministry of Agriculture and Forestry. The laboratory for livestock has the capacity to perform bacterial, fungal and parasitic analysis, but not for the examination of virus infections. The bacteriology laboratory has the ability to isolate and identify most bacterial species. Fish disease capability can be developed from collaborative activities with existing laboratories. Given that, there remain numerous requirements to support activities for surveillance, monitoring and diagnosis such as:

- Training of staff on diagnosis of bacterial and viral diseases;
- Prevention and treatment methods for bacterial, viral and parasitic diseases;
- Active surveillance technique for livestock and aquaculture;
- Manual for veterinary and clinical parasitology, bacteriology and virology for aquatic animals; and
- A color atlas of clinical parasitology, bacteriology and virology for aquatic animals.